

REMARKS

In the Office Action dated November 29, 2006, claims 10-24 were examined with the result that all claims were rejected. The Office Action was a non-final rejection. In response, applicant has cancelled claim 23, and amended claims 1 and 24. In view of the above amendments and following remarks, reconsideration of this application is requested.

In the Office Action, the Examiner rejected claims 1-24 under 35 U.S.C. § 102(b) as being anticipated by Chang et al U.S. published application number 2003/0032352 A1 (hereinafter referred to as Chang et al). The Examiner states that Chang et al teaches a method of preparing ion-triggerable cationic polymers in a mixed solvent solution of water and acetone under free radical conditions with removal of excess solvent. The Examiner thus believes Chang et al anticipates claims 1-24. Applicant, however, respectfully disagrees for the following reasons.

Applicant believes claim 1 has been amended to clearly distinguish over Chang et al. First, step E of claim 1 has been amended to require adding water to the reaction mixture after polymerization. Then, step F has been amended to require removing substantially all of the acetone from the reaction mixture "after adding water." Finally, a new step G has been added to claim 1, which requires recycling of the acetone removed from the reaction mixture. Essentially, the limitations of original claim 23 have now been added as new step G to claim 1. Thus, claim 1 requires using the acetone removed after polymerization from step F to prepare the mixed solvent solution of step A, i.e. recycling of the acetone solvent. Finally, in view of the cancellation of original claim 23 and the incorporation of its limitations into claim 1, the dependency of claim 24 needed to be revised so that claim 24 now properly depends from claim 1 as amended. Also, claim 24 was revised to indicate that the recycled acetone is obtained from step F and not step E.

The above limitations added to claim 1 distinguish over Chang et al. As noted above, claim 1 now requires adding water to the reaction mixture after polymerization,

removing the acetone from the reaction mixture after adding the water, and finally using the acetone removed during step F to prepare the solvent solution of step A. These limitations now distinguish claim 1 from Chang et al because Chang et al teaches neither (1) adding water after polymerization and before removing the solvent, nor (2) recycling the acetone to prepare the mixed solvent solution for polymerizing the polymer.

Specifically, applicant refers the Examiner to example 1 found at page 21 of Chang et al, and more specifically to the latter half of paragraph 0185 of example 1. The Examiner will note that after polymerization, Chang et al immediately distills the methanol from the reaction mixture. Then, only "when the distillation was completed (about 3 hours)" was water added to the polymer solution. Thus, Chang et al polymerizes, then distills off the solvent, and finally adds water to the polymer solution. In contrast, applicant polymerizes, then adds water to the reaction mixture after polymerization is complete, and thereafter distills off or removes the acetone from the reaction mixture. Essentially, applicant reverses the steps set forth in Chang et al. This distinction, however, is important to the polymerization process because removing the solvent first after polymerization as in Chang et al results in a reaction mixture having extremely high viscosity since all of the solvent has been removed from the reaction mixture. Essentially, Chang et al's end product becomes almost a solid mass of material. This, of course, is why when Chang et al finally does add water, the solution needed to be stirred "overnight" (see last sentence of paragraph 0185 of example 1 of Chang et al). Since all of the solvent has been driven off of the reaction mixture, it required a significant amount of time to solublize the polymer in the water.

In contrast, applicant requires the water to be added after polymerization is complete and before removing the solvent. As a result, the viscosity of the reaction mixture is relatively low so that it can be handled and mixed using conventional mechanical apparatus. It is to be particularly noted that Chang et al's process is clearly a laboratory process, and this is obvious from the fact that example 1 refers to preparing the polymers in a "1000 ml round bottom three neck flask." The process described in Chang

et al may thus be appropriate for laboratory procedures, but would not be appropriate for preparing the polymer on a commercial scale. It would be extremely difficult to prepare the polymer according to Chang et al on a commercial scale since the polymer would require a significant amount of time to resolublize after driving off the solvent. Thus, adding water first before removing the acetone solvent distinguishes the present claim 1 as amended not only step-wise from what is disclosed in Chang et al, but also functionally.

The Examiner will note that claim 1 has also been amended to require recycling of the acetone solvent. Chang et al does not teach, suggest or describe a process which involves recycling, much less recycling of the acetone. Again, recycling of the acetone renders applicant's process commercially feasible. The solvent is a significant cost in the overall process, and if new solvent is required each time the solvent solution is prepared, the process becomes commercially cost-prohibitive. These advantages of using acetone in the present process are set forth in paragraphs 0008, 0020 and 0021 in the application as filed.

Finally, the Examiner will note that one of the advantages of using acetone is that it achieves an end product of relatively high molecular weight, as opposed to other lower alcohols or lower ketones, such as for example methanol or ethanol, that might be used as a solvent as set forth in Chang et al. Acetone is easier to remove and recover from the reaction mixture in high purity than other solvents, such as methanol or ethanol, so that it can be more readily recycled for use in subsequent polymerization reactions. This is evidenced by the results obtained in examples 2-5 set forth at page 14 of applicant's specification. In the table of parameters at the bottom of page 14, the Examiner will note that the percent acetone in the distillate composition for example 2 and example 3 were both 74.0% while for example 4 it was 70.2% and for example 5 it was 72.5%. Thus, since the preferred solvent solution comprises 75% by weight acetone and 25% by weight water, examples 2 and 3 would require only 1% makeup acetone, while example 4 would

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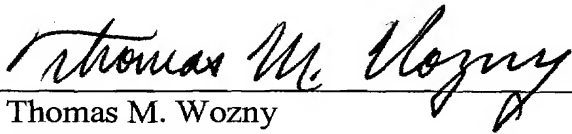
require only 4.8% and example 5 2.5% of makeup acetone. This is a significant advantage in a commercial process.

It is also important for the Examiner to note that Chang et al basically equates methanol, ethanol, and propanol with acetone for use as the solvent in the polymerization process in paragraph 0026 thereof. However, in comparative example 1 beginning at the bottom of page 17 of applicant's specification, applicant prepared the polymers in methanol, and as discussed therein, preparation of the polymer in methanol limits the molecular weight of the polymer thus resulting in low molecular weights. Comparative example 2 beginning at the bottom of page 18 illustrates preparation of the polymers in ethanol. Again, an ethanol reaction mixture resulted in a polymer with low molecular weight. Higher molecular weights are needed for product performance, and as seen by the "product evaluation" found at page 19 of applicant's specification, neither the polymer produced with methanol nor the polymer produced with ethanol resulted in an acceptable product. Finally, as noted by applicant, methanol and ethanol solutions with water are difficult to separate and thus do not lend themselves to reuse, i.e. recycling.

In view of the above, applicant requests the Examiner withdraw the § 102(b) rejection based on Chang et al.

Respectfully submitted,

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